Base Station

Airborne / Ground (GSM-19W v7.0)

The GEM Base Station provides the most accurate system for acquring data for diurnal corrections today. It is designed for airborne or ground surveys where data quality, cost control and ruggedness are the keys for project success.

New technologies provide even more value:

- **Wide range of sampling frequencies from 1 hour to 0.2 seconds**
- **Easy operation via menus and system design**
- **Sensitivity of 0.022 nT @ 1 Hz is ideal for correcting airborne or ground data**
- **GPS time values through internal / external option**
- **Easy to use quality control / downloading software via GEMLinkW**
- **High volume storage of 32 Mbytes is more than sufficient for multiple day recording**
- **Proven reliability based on 25 years of R&D**

And all of these technologies come complete with the most attracive savings and warranty in the business.



Airborne Base Station setup showing two GSM-19W magnetometers with consoles and external battery. Ground Base Station setup is similar.

When working with magnetic data, it is important to consider the effects of phenomena such as daily magnetic drifts (diurnals) on the order of a few 10s of nT and micropulsations on the order of thousands of nT from the interaction of the solar wind with the earth's magnetic field.

These effects are felt both in the air and on the ground; hence the need to apply corrections to raw data to achieve the highest quality in final magnetic maps on which earth science decisions are made.

Proven in the Field

GEM's base station offerings are designed using experience gained in long-term monitoring for magnetic observatory applications where it is essential to have stable, reliable and drift-free results for accurate compilation of results.

This experience has led to GEM's position as a leading supplier of base station magnetometers for both airborne and ground survey applications.

The leading offering is the GSM-19W magnetometer that has recently been upgraded in Version 7 systems with fast sampling (5 Hz), enhanced memory and noise-free sampling algorithms. These features complement other advantages of the system including its high sensitivity (0.022 nT @ 1 Hz); low power consumption; and minimal long term drift of 1 part per million per year (from observatory experience).

An optically pumped Potassium base magnetometer is also available for users who require extremely sensitive readings at 0.0005 nT.

Easy Operation

The key considerations in operating a GEM base station magnetometer comprise location, setup, synchronization,

operation and downloading; each of these steps is easy to accomplish and delivers a number of benefits, hence, they will be described individually.

Location

Guidelines typically call for location of base stations 100 m or more away from large ferromagnetic objects or active roads and highways. In addition, it is recommended to operate 200 to 500 m away from power lines where possible.

Some surveys may call for base stations to be located a large distance from the survey site; a distance of 60 km or so is the largest distance to be of practical use in a survey.

To assist in setting up surveys, GEM provides base stations with standard 10 m cable lengths; which is typically sufficient to locate the base station away from typical noise sources. Other lengths are optional.

Survey Set Up

Survey set up is a fast process; requiring the selection of a location and then positioning the unit. There is no need to shield the unit from the elements as it is weatherproof and tested in many climates around the world.

Once the base station location is determined, the console and sensor times are established and the system is started.

Synchronization

For proper operation, the rover magnetometer and the base station magnetometer must be synchronized. GEM provides three easy ways to synchronize:

* Use GPS time on both units (both units must be equipped with GPS). This method does not require any interfacing between units as GPS times are the same for each.

* Use rover GPS (only rover GPS equipped with GPS). The operator connects the two units together and sets the base station time to the current GPS time. Units are then disconnected for surveying.

* Use local time. The operator sets the local time on one unit and then connects the two units together for synchronization.

All methods produce highly accurate results based on the timing precision provided in the GEM GSM-19W

Operation

For ease-of-use and efficiency, GEM's base units are provided with three programmable modes of operation:

* Immediate Start - The operator sets this option and then a pre-designated start key. The system starts recording automatically.

* Daily Start - The operator specifies a time at which the base station is to turn itself on during each day of surveying. This simplifies field work and means the operator does not necessarily have to travel to the base station location each day, hence is a time-saving capability.

* Start - The operator preprograms up to 30 start and end periods. This mode of operation can have huge benefits for large surveys or when the base station is located some distance away.

With each method, data is downloaded either by connecting a cable between rover and base units, and automatically performing drift corrections; or by downloading each of the rover and base data files and then performing corrections using GEM's GEMLinkW software.

Downloading

GEM's GEMLinkW software is an easy-to-use program that enables fast correction of rover files from base station data. Final data is marked with GPS or local time along with magnetic data. Data is then ready for import into industry-standard software for processing and analysis.

Options

Options include internal GPS, backpack, 12 V external power cable and memory. The backpack can be useful as it enables the operator to use the system as a rover unit … serving as a backup to other field systems. A 12 V power cable is available for hooking up to a car battery. 16 Mbytes of memory can also be added.

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Specifications

Performance

Sensitivity:	0.022 nT / √Hz
Resolution:	0.01 nT
Absolute Accuracy:	+/- 0.1 nT
Dynamic Range:	15,000 to 120,000** nT
Gradient Tolerance:	< 10,000 nT/m
Sampling Rate:	1 hour to 5 Hz
Operating Temperature	-40°C to +50°C
Time Keeping	Internal Battery

Power Consumption

With GPS:	4 W
Without GPS:	2 to 3 W

Storage - 32 MB (# of Readings)

Base:	5,373,951

Dimensions

Console:	223 x 69 x 240 mm
Sensor:	175 x 75 mm diameter cylinder

Weights

Console:	1.5 kg
Sensor:	1.0 kg

Outputs

Cycled measurements of the Total Magnetic Field with time and magnetic readings as digital readout or in ASCII format through an RS-232 COM port. USB interface also provided.

Standard Components

GSM-19 console, GEMLinkW software, battery, harness, charger, sensor with cable, RS-232 cable, RS-232 to USB interface cable, staff, instruction manual and shipping case.

Software

Basic field quality control (QC) using GEMLinkW (provided free-of-charge)

For advanced processing and analysis, GEM can provide access to industry standard software packages.

Options

Internal / External GPS, 12 V power cable, backpack.

Rev. 28/02/2008